FINAL PROJECT REPORT

ALTA WATER PROJECT
MONT A/E 86-46-118

FOR

DEPARTMENT OF STATE LANDS

ABANDONED MINE RECLAMATION BUREAU

HELENA, MONTANA

BY

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I. INTRODUCTION.

A. HISTORY.

The Alta mines are abandoned hard rock mines located in Section 10, T7N, R6E, Jefferson County, Montana. The mines are at an elevation of 5600' above sea level, and are about 1-1/2 miles southwest of the Town of Corbin. Polluted mine discharge which originates from these former mines and the old mine tailings flows underground and travels under the township of Corbin. Six of the existing wells that serve the residences in Corbin were tested and found to be contaminated from the mine discharge. In addition, Spring Creek, which provides water to 9 of the 16 residences in Corbin were also tested and found to be contaminated with residue from former mining activities.

B. OBJECTIVES.

The objectives for this project were as follows:

1) Supply the residents of Corbin with a source of potable water which is free of contamination from mining.
2) Ensure the water supply is free from potential bacterial contamination.
3) Ensure that the residents will have a sufficient quantity of water during periods of peak usage.
4) Ensure the water supply will provide adequate water pressures to all users.
5) Make all components of the system as aesthetically pleasing as possible.
6) Protect the components of the system from vandalism, breakage or damage of any kind.
7) Provide a maintenance free and energy independent water system.
8) Meet all the requirements of the Montana Department of Health and Environmental Sciences for a public water supply.

C. WORK DONE.

Corbin is a small community located in Sections 1, 2 and 11, T7N, R6E, Jefferson County, Montana. This is about 20 miles south of Helena and 2 miles southwest of Jefferson City. The elevation of Corbin is about 4800 feet.

Work for this project consisted of developing a ground water supply located approximately 1 mile southwest of the community, laying about 0.8 miles of 3" transmission pipe, constructing a buried 35,000 gallon concrete water storage tank, a chlorination facility, approximately 1280 L.F. of 6" water main, 1224 L.F. of 1-1/2" water main, 15 - 3/4" stub-ins with curb stops and 15 service connections. The necessary valves, connections, keys, flushing hydrants, hydro-seeding and related work were also included.

II. DESCRIPTION OF CONTRACT.

A. CONSTRUCTION DATES AND SUPERVISORS.

Bid Date	October 7, 1986
Lowest Bidders	1. Klein Construction Helena, Montana Bid $ 92,501.22
	2. G.M. Construction Lincoln, Montana Bid $ 99,581.00
	3. Ingram-Clevenger Helena, Montana Bid $121,085.60
Contractor Award Date	October 16, 1986
Notice to Proceed Date	November 19, 1986
Preconstruction Date	October 30, 1986
Startup Date	November 20, 1986
Completion Date	May 5, 1987
DSL Supervisor	Mr. Ben Mundie
Delta Engineering Inspectors	Mr. Tom Ward Mr. Mike Brown, P.E. Mr. Gerry McFaul, P.E.

B. CONSTRUCTION METHODS.

Klein Construction, the prime contractor performed the following:

1) Formed, poured, stripped, tested and sealed the concrete storage tank.

Jon Grandy of G&N Construction, the piping subcontractor performed the following:

1) Constructed an access road to the well.
2) Developed the water supply by installing a collector manhole, collector pipes, a PVC liner and a gravel bed for the collector pipes.
3) Installed a 3" Transmission line to the concrete storage tank, including two 3" Gate Valves.
4) Installed a chlorination facility and flow meter.
5) Excavated for and backfilled the buried concrete storage tank.
6) Installed a 6" and a 1-1/2" distribution system from the concrete tank through the town (including all the necessary valves).
7) Installed 3 flushing hydrants with 3 protective posts and a 4" Gate Valve for each hydrant.
8) Installed curb stops for all users.
9) Tested the distribution system and the transmission line
10) Installed a service line for each user from the curb stop through the foundation of each user.
11) Buried the valve boxes that were in the way of the county motor patrol.

Cottrill Hydro-seeding, the hydro-seeding subcontractor, performed the following:

1) Seeded all disturbed hillsides.
2) Hydro-mulched the seeded hillsides.
3) Seeded all disturbed lawns.
4) Hydro-mulched all disturbed lawns.

The fencing contractor, Grizzly Fence, installed all fences and gates.

C. LIST OF EQUIPMENT USED ON THE PROJECT.

Type	Make & Model	User	# of Units
Track Excavator	John Deere 690B	G&N	1
Track Excavator	Drott	G&N	1
Rubber Tired Backhoe	John Deere 500C	G&N	1
Rubber Tired Loader	John Deere 644B	G&N	1
Track Dozer	Case 1000	G&N	1
12 C.Y. End Dumps	Various	G&N	3
3.0 H.P. Water Pump	Briggs & Stratton	G&N	1
Construction Trailer	Unknown	G&N	1
Equipment Trailer	Miller	G&N	1
500 gallon Hydroseeder	International	Cottrill	1
1000 gallon Hydroseeder Trailer	Unknown	Cottrill	1
500 gallon Water Truck	Ford	Cottrill	1
10 C.Y. Cement Trucks	Various	Klein	3
3.5 H.P. Power Plant	Briggs & Stratton	Klein	1
Compressor and Jackhammer	Unknown	Grizzly	1

D. PLANNING PROBLEMS OR DESIGN CONSIDERATIONS.

The major problem on this project was in receiving approval from the Water Quality Bureau (WQB) of the Montana Department of Health and Environmental Sciences (MDHES). The Ten State Standards, which have been adopted by the State of Montana, require a 24 hour test, but the WQB arbitrarily decided to require a 30 day test for this project, and then took another 38 days to evaluate the data. Thus, the project was shut down from December 5, 1986 through February 11, 1987. The weather during this period was unseasonably warm, and construction would have continued through this time except for this arbitrary decision. The WQB finally approved this project on February 6, 1987 and construction proceeded on February 12, 1987.

III. COST SUMMARY.

A. BREAKDOWN OF CONSTRUCTION ITEMS & UNIT COSTS.

	Item	Quantity	Bid Price	Total Price
Original Contract Items				
101	* Access Road to Spring	540 LF	$ 7.22	$ 3,900.00
102	Spring Development	1 EA	8,600.00	$ 8,600.00
103	6" PVC C900, CL150 Water Main	1280 LF	13.28	$16,998.40
104	3" PVC CL160 Water Main	4239 LF	4.75	$20,135.25
105	1-1/2" PVC CL160 Water Main	926 LF	6.50	$ 6,019.00
106	1-1/2" PE CL160 Water Main	298 EA	5.90	$ 1,758.20
107	6" Gate Valve with Box	4 EA	300.00	$ 1,200.00
108	3" Gate Valve with Box	2 EA	200.00	$ 400.00
109	Intermediate Service Line Valve;1-1/2"Curb Stop & Box	4 EA	75.00	$ 300.00
110	3/4" Stub-ins (Main to Curb Stop)	15 EA	200.00	$ 3,000.00
111	Flushing Hydrant with Gate Valve	3 EA	1,500.00	$ 4,500.00
112	Disinfection Facility	1 EA	6,750.00	$ 6,750.00
113	Concrete Storage Tank	1 EA	22,331.24	$22,369.91
Change Orders				
201	Fees to Landowner for Access	1 EA	560.00	$ 560.00
202	Filter Gravel	47.43 CY	27.50	$ 1,304.13
203	6 mil Polyethylene-8' wide	80 LF	0.24	$ 19.04
204	Gate Valves	3 EA	35.28	$ 105.84
205	Insulate Chlorinator Manhole Lid	1 EA	67.20	$ 67.20
206	Flow Meter, Installed	1 EA	780.08	$ 780.08
207	6" 45° CI Pipe Bend with Thrust Block	1 EA	190.40	$ 190.40

208	Hydroseeding the Hillsides	6 Acres	1,773.33	$10,640.00
209	Hydroseeding Lawns	9431 SF	0.056	$ 528.14
210	Service Connections	12 EA	512.96	$ 6,155.52
211	4" x 6-1/2" Steel posts, painted, encased & filled with concrete	9 EA	112.00	$ 1,008.00
				$117,289.12

* This item was lump sum in the bid package, but was broken down to lineal foot (by scale) of road installed. This road included a 28 LF x 24" Dia. CMP culvert and a 30 LF x 36" Dia. CMP culvert.

B) ANALYSIS OF CONSULTANT COSTS

PROJECT NAME: ALTA WATER PROJECT
PROJECT NO.: MONT A/E 86-46-118
DATE PREPARED: JULY 2, 1987

SERVICE	AMOUNT
ENGINEERING DESIGN	
1984	$ 18,106
1985	
SUBTOTAL ENGINEERING DESIGN:	$ 18,106
CONSTRUCTION INSPECTION AND ADMINISTRATION	38,492
1984	
1985	
1986	
SUBTOTAL CONSTRUCTION INSP. & ADMIN.	$ 38,492
TOTAL PROJECT ENGINEERING COST:	56,598
TOTAL CONSTRUCTION COST:	$117,289

COST COMPARISON - PROJECT ENGINEERING/CONSTRUCTION

ENGINEERING DESIGN/CONSTRUCTION	15.4%
CONST. INSP. & ADMIN./CONSTRUCTION	32.8%
TOTAL PROJECT ENGINEERING/CONSTRUCTION	48.2%

IV. SUMMARY OF THE JOB.

The construction of this project was completed without any major problems. The only difficulty was the two months delay resulting from the WQB. The prime contractor and his subcontractors were easy to work with, and were interested in completing a successful job - on time and at the contract price. In addition, they incorporated several extra items at no additional cost; they used 5000 psi concrete for the storage tank rather than the required 4000 psi; they installed gate valves on each service and extended the services through each foundation. They also installed a 5-wire fence around the tank rather than the specified 4-wire.

The objectives for the project and their solutions are listed below:

1) Supply Corbin with potable water that is uncontaminated by mining operations.

An artesian well was located about one mile south of the town of Corbin, and therefore one mile from the contaminated underground water source that supplied many of the houses in Corbin. This uncontaminated well eventually joins the contaminated Spring Creek, but is above the confluence. The project design assumed this artesian well would supply 55 gpm, but well tests indicate over 60 gpm are are available. Water quality is good and meets all federal and state standards for potable water. No mineral contamination was evident in this supply.

2) Ensure this supply is free from bacterial contamination.

The source was tested and found to meet state standards. In order to maintain potable disinfection requirements, a chlorination facility was included as part of the project. The town of Corbin is responsible for all testing, chlorination, operation and maintenance.

3) Ensure all users have sufficient water available, even during periods of peak usage.

This was accomplished by completion of the 60 gpm well and the construction of the 35,000 gallon water storage tank. This storage will supply domestic needs only; and will not provide additional demands from irrigations.

4) Ensure all users have adequate water pressures.

The elevation of the tank outlet is at 4858, while the highest occupied house is at 4793 and the lowest is at 4745. Thus the pressures range from 28 psi to 51 psi. All the residents using the new distribution system have over 34 psi. The average pressure to the houses on this new distribution line is 38.6 psi. Previously each house had its own pump, which was on from 12 psi to approximately 30 psi. Thus, the new system provides better pressures without pumps.

5) Make all components of the system aesthetically pleasing.

All items on this system are buried except for the 2'x4'x6' chlorinator building and the 3 flushing hydrants and protective posts. The chlorinator building is green to blend in with the grass on the hillside, and the flushing hydrants are an earth brown. The only obvious items are the protective posts around the hydrants, which need to be obvious for safety reasons.

6) Protect the components from vandalism, breakage or damage of any kind.

With over 90% of the system buried, the probability of vandalism is very slight. Since the pipe is six feet deep, it will not experience frost (some of the pipe on the existing system was only 3-1/2 feet deep and hadn't frozen during its 20 year life). Also, with the pipe at 6' deep the only utility that could disturb it would be a sanitary sewer system. The above ground items have also been protected. There are 2 barbed wire fences around the chlorinator building, and 2 padlocks to discourage unauthorized entry. Each flushing hydrant has 3 brightly colored, concrete filled and concrete encased posts to warn drivers and protect the hydrants.

7) Provide a maintenance free and energy independent system.

The project was completed without the use of pumps, air release valves, or pressure tanks. There is nothing on the system that will require electricity. The only maintenance required will be that every six months the chlorine bottles will need to be changed.

8) Meet all the requirements of the MDHES for public water supplies.

This final objective was met by submitting the necessary forms to the DHES and by complying with their requests as necessary.